7 April 1993 Final Student Research Report

Wanted: C4I Warriors, The Requirement for Marine Corps C2 Systems Planners

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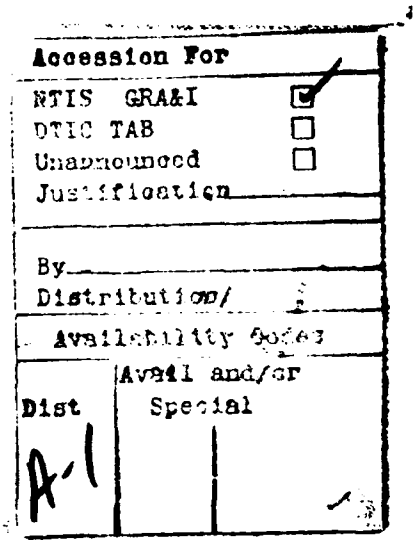

Thesis: To meet the evolving requirements of modern warfare, the United States Marine Corps must maintain a cadre of C2 Systems Planners to operate Command and Control systems. To atttain this goal, the Marine Corps must integrate C2 Systems personnel into one Data Communications MOS and implement a comprehensive C2 Systems Planner specific training program. This paper examines the future role of the C2 systems planner and recommends combining the Data and Communications officer MOS'.

USMC; Command and Control; C2; C3; C4I; Joint Command and Control; MTACCS; MAGTF Systems; Training; Information Technology; LAN; WAN; 33

Unclassified Unclassified Unclassified

WANTED: C4I WARRIORS
THE REQUIREMENT FOR MARINE CORPS C2 SYSTEMS PLANNERS

Submitted to
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OUTLINE

Thesis: To meet the evolving requirements of modern warfare, the Marine Corps must maintain a cadre of C2 Systems Planners to operate command and control systems. To attain this goal, the Marine Corps must integrate C2 Systems personnel into one Data Communications MOS and implement a comprehensive C2 Systems Planner specific training program.

I. The Modern Battlefield

II. Background

- A. Meaningful integration of C2 systems and personnel requires a basic understanding of the C4I concept.
- B. A technology explosion has caused a reliance on computers to manage C2 systems.
- C. Success in the C2 arena requires effective integration of C2 systems and personnel.

III. Future Marine C2

- A. Reliance will be placed upon MTACCS (Marine Tactical Command and Control System) to manage future MAGTF C2 systems.
- B. Systems integration is required within the MTACCS concept.

IV. Proposed Solution

- A. Creation of the Data Communications Officer can be accomplished in three phases.
  1. Redesignation of 2502 and 4002 as Data Communication Officers
  2. Consolidation of 2502 and 4002 MOS Fields
  3. Information System Training for Current 4002 Company Grade Officers
- B. The newly created Data Communications MOS offers advantages as well as disadvantages.
- C. Establishment of the C4I Systems Planner Additional MOS (AMOS) will improve C2 systems integration within the Marine Corps.

V. Conclusion

Appendix 1 - Proposed Data Communications Officer Course Curriculum

THE REQUIREMENT FOR C2 SYSTEMS PLANNERS

THE MODERN BATTLEFIELD

Success on the modern battlefield depends greatly upon the responsiveness of various command and control (C2) systems and their timely interpretation, presentation, and dissemination of critical information to the operational commander. The importance of this issue is magnified by the fact that the Marine Corps continues to develop and field a significant number of C2 systems which intersect all battlefield functional areas. This rapid increase of state-of-the-art information systems not only demonstrates the complexities which technology brings to the battlefield, but also validates the requirement within the Marine Corps for capable C2 systems planning personnel.

Future Marine Corps C2 systems will be required to receive information from and provide information to a myriad of joint and combined agencies while conducting operations. Without proper planning and employment of C2 systems, the operational commander will be quickly overloaded by rapidly evolving C2 systems technology. Currently, the Marine Corps does not properly train or utilize communications and data systems officers to employ multiple C2 systems in the joint and combined arena.

Today, with the advent of Tri-Service Tactical (TRI TAC) systems and other new capabilities, the Data Communications Officer must be conversant at all levels of communications and with other service capabilities. To meet the evolving requirements of modern warfare, the Marine Corps must maintain a cadre of C2 systems planners to operate command and control systems. To attain this goal, the Marine Corps must integrate C2 systems personnel into one data communications MOS and implement a comprehensive C2 systems-planner-specific training program.

In short, the integration of communication and data systems within the Marine Corps has already taken place. This integration has increased the effectiveness of the commander and reduced the role of uncertainty on the modern battlefield. The next logical step should be the integration of C2 systems personnel. Martin Van Crevald clearly expresses the significance of command and control to the battlefield commander in his book Command In War:

> The problem of commanding and controlling armed forces, and of instituting effective communications with and within them, is as old as war itself. A Stone Age chieftain had to devise the optimal organization and find the methods and technical means to command the forces at his disposal. From his day to ours, failure to consider and to solve the problem was to court disaster...indeed, to make it impossible for the forces to exist. (12:1)

The core of an effective C2 system is the ability to collect, process, display, store, and forward essential

information to the commander, in such a manner as to timely influence the battle.

C4I CONCEPT

Meaningful integration of C2 systems and personnel requires a basic understanding of the C4I concept and issues. General Gray, our former Commandant describing the essence of this concept in White Letter 01-91, charged commanders to "educate and train...instill the C4I concept into your Marines until it becomes the only way of thinking with regard to the effective integration of all command and control assets to support the commander." (2) The C4I concept is described in White Letter 01-91:

> Command and control are crucial to success, particularly in war...The command and control system is the commander's central nervous system...Command and control systems will always be considered as a totality including personnel, equipment, procedures, and information...Interoperability is the vital element that ties this concept together...We organize and fight as MAGTFs, independently, and in concert with joint and combined operations. All command and control systems must support our warfighting philosophy and warfighting needs. (2)

Effective integration will require the support and cooperation of all involved, or the efforts will fall short of the goal of supporting the operational commander. This requirement of effective C2 integration will be particularly evident as both resources and personnel are reduced in future military budgets.

TECHNOLOGY EXPLOSION

A dynamic C2 system must focus on the continuing need for the commander to be able to process the information received, make sound decisions, and transmit these decisions in a timely manner to those Marines who must act upon them. The size and nature of future battlefields will dictate the importance of timely and accurate information in support of C2. Integrated C2 systems and the technology they offer not only change the character of war: they also change the behavior of modern military organizations. Use of this technology enables commanders not only to gain advantage over the enemy and reduce uncertainty, but also to reshape the traditional processes on the battlefield by which they plan operations and manage forces in battle. Van Crevald comments: "uncertainty being the central fact that all command systems have to cope with, the role of uncertainty in determining the structure of command should be... and in most cases is...decisive." (12:268)

The command systems employed by the United States forces during Desert Shield/Storm reduced uncertainty, allowing the coalition forces to efficiently destroy a large Iraqi force in a time-compressed war. The technology used by United States forces at the start of the war was a major advantage, despite the apparent parity in force numbers, the Iraqi army's edge afforded by defending on its

homeland, and the long lines of communication. Effectively integrated C2 systems supported the timely phasing of all resources and personnel that were required. Computer networks over satellites, telephone circuits, and radio links were essential in tying together United States and coalition forces with critical data and information. Tactical and strategic systems gave instant warning of Iraqi missile launches, provided commanders with up-to-date logistics and force information, and permitted rapid planning of combat operations. (5)

C2 INTEGRATION

Within the Marine Corps, communications and data systems have evolved independently over the years. Each system performed its unique function and presented its own advantages and disadvantages to the commander. Until recently, these two components supported the commander as distinctly separate entities. The communication system "moved information" and the data system "processed information"; seldom did the two meet. (7) Recent events from Desert Shield/Storm have demonstrated that communication and computer equipment, properly connected, can produce a C2 system which is greater than the sum of the separate parts. The computer, when connected to the existing communication system, provides an important advantage to a combat force and its commander.

Timely and reliable information is the cornerstone to successful tactical operations. As noted in a recent after-action report from Operation Desert Storm:

> The use of computers in local and wide area networks eases the burden of AUTODIN while providing the Marine Expeditionary Force (MEF), Wing, Division, and Force Service Support Group (FSSG) staffs an accessible responsive means to distribute information on the battlefield. The use of personal computers to process information and as a terminal device for communication circuits has made the military teletype obsolete. During Desert Shield/Storm the Local Area Network (LAN)/Wide Area Network (WAN) configuration used by MARCENT performed many information system services. In the case of record traffic, the LAN/WAN provided a means for geographically dispersed units to send and receive AUTODIN messages via a communications center located miles away. Coupled with the use of the tactical telephone system providing a dial up service in either a point to point or into a LAN server, the use of computers for data transfer significantly enhances the speed, flexibility, and redundancy of the communication system. (10)

A serious issue facing the Marine Corps is the lack of specifically trained C2 systems personnel who are familiar with all aspects of command and control. The formation of the G-6 at the general staff level, as outlined in the C4I concept, has worked well to correct this deficiency. Additionally, the creation of the Information System Coordinator (ISC) within the S-6 establishment and alignment provides a single point of contact for communication and data issues. (9)

A reorganization which implements a new operating philosophy invites certain degrees of resentment within members of the military hierarchy. Personal opinion, military occupational skill (MOS) concerns, and equipment stovepipe issues have prevented a Marine Corps-wide C4I concept implementation. The core of this problem is twofold: the emerging requirement for complete C2 system integration and the necessity for consolidation of C2 systems planning personnel (MOSs 2502 and 4002) at the officer level.

Today, C2 systems integration crosses all functional areas. Tactical systems are required to interface with administrative systems daily. Garrison systems are taken to the field and interfaced directly with tactical systems. Almost no distinction exists between the two in this age of information transfer. While C2 systems integration is crucial to future success on the modern battlefield, integration and consolidation of C2 system planners (MOSs 2502 and 4002) is equally important to ensure that success.

A deficiency exists today concerning C2 systems integration, concepts, personnel requirements, and capabilities within the framework of the C4I concept. Consolidation of MOSs 2502 and 4002 would create a solid information systems awareness among C2 system users within the Marine Corps officer community, ultimately making the

job of those performing C2 systems planning less arduous. As the Marine Corps acquires more sophisticated C2 systems, it will become impossible to distinguish between data problems and communication problems. The Marine Corps will require officers skilled in both disciplines to effectively employ C2 systems. The outlined MOS consolidation as herein detailed will accomplish the goal of providing qualified C2 systems planners.

FUTURE MARINE C2

The requirement for data communications capabilities in the Marine Corps will expand dramatically in the future. A marked increase will occur in computer local area networks (LANs) and wide area networks (WANs) utilization. LANs and WANs have been used extensively, both in garrison and in the field, for several years. Their acceptance as a powerful information tool continues to escalate within Marine circles.

Computer networks support functional areas of Marine Corps operations from administration to logistics. Though many of these networks are tailored for garrison use, deployable mainframe computers now exist to increase the responsiveness of personnel, supply, and maintenance requirements. Local area networks are now commonplace in large field deployments. These LANs provide a variety of functions previously unavailable, such as electronic mail, file transfer, and real-time interactive keyboard exchange.

MTACCS

The future of Marine Corps data communications brings even greater challenges to the personnel tasked with designing, configuring, and maintaining the LANs and WANs, and the communication systems they ride. Automated command and control systems in the Marine Corps will fall under the umbrella of the Marine Tactical Command and Control System (MTACCS). MTACCS consists of several component systems to provide the MAGTF commander the ability to receive, process, and display tactical information for decision making. Specifically, MTACCS will assist the commander in planning, coordinating, and supervising the tactical employment of aviation, ground, and combat service support C2 assets. (6)

These systems will be connected via LANs and WANs riding the digital switched backbone system. System connectivity is planned throughout the MAGTF down to the battalion/squadron level. A description of planned tactical automated systems is required to demonstrate how far this technology will develop during the next three to five years. The following systems are currently at various stages of development within Marine Corps Systems Command.

Tactical Combat Operations (TCO) will be the commanders' work station within the Marine Tactical Command and Control System (MTACCS). TCO will allow commanders

to receive, fuse, display, and disseminate select information from other component systems of MTACCS. Additional TCO attributes include automated message management, mission planning, development and dissemination of operations orders and overlays, display of current friendly/enemy situations, display of fire support, and maneuver control measures. (11)

Advanced Field Artillery Tactical Data System (AFATDS) will be the fire support arm of MTACCS. AFATDS is designed to automate the command, control, and coordination between fire support elements and fire support coordination centers. Information such as target lists, fire missions, fire planning, and friendly locations will be passed over AFATDS terminals. (11)

Marine Combat Service Support Control System (MCSSCS) is the new name associated with the family of PC-based systems formerly called Marine Air Ground Task Force II/Logistics Automated Information System (MAGTF II/LOG AIS). MCSSCS is an integrated system that contains several logistics support applications pertaining to maintenance, logistics, supply, medical support, transportation, and personnel status issues. (3)

Intelligence Analysis System (IAS) is a computerized tool planned for use in intelligence sections. The system will automate the transfer and analysis of intelligence

information while increasing speed and improving accuracy. The IAS will provide access to intelligence databases, automated maps, on-line journals, and an imagery dissemination device. (11)

Advanced Tactical Air Command Central (ATACC) incorporates state-of-the-art technology to command and coordinate tactical air operations, conduct automated mission planning, and provide Air Tasking Order (ATO) generation and processing. (11)

MTACCS will give the Marine Corps a comprehensive command and control system. Figure 1 depicts future MAGTF C4I systems that the C2 systems planner will have to engineer and install in the future.

FUTURE MAGTF C2 SYSTEMS

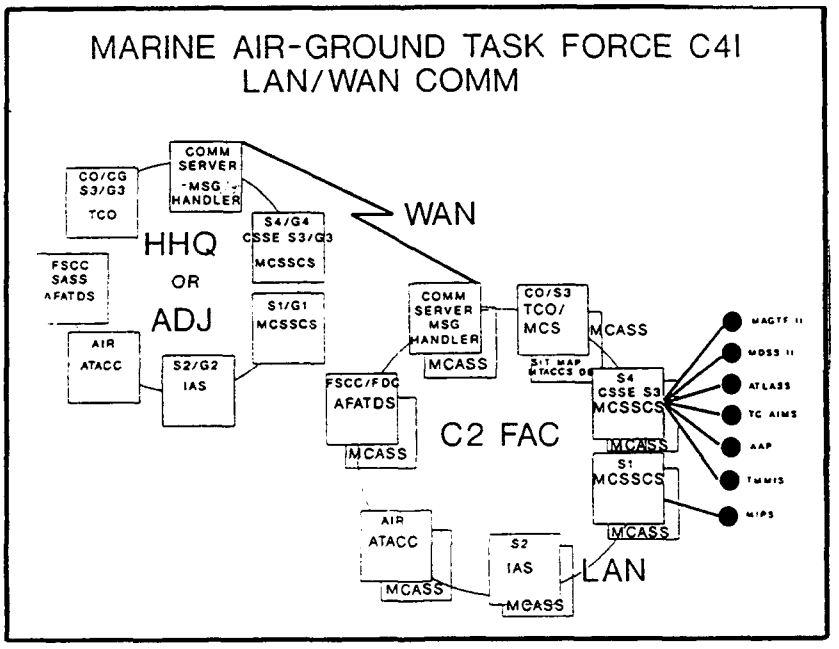

FIGURE 1

These systems will require skilled managers and technicians. Data communication system planning extending down to the battalion level will be a challenge for the most creative communicators. Configuring the servers to support the various systems will be even harder with the current cadre of data systems personnel. Increasing responsibilities will be placed on the unit information system coordinator (ISC).

SYSTEM INTEGRATION

System integration planners have placed great emphasis on the requirement for common computer hardware and software within MTACCS Systems. The use of common hardware and software will make component systems of MTACCS interoperable. The overlap between systems will reduce the amount of training required by MTACCS managers and users. The real challenge of MTACCS implementation will be to provide qualified personnel to configure terminals and LAN servers. In the design of MTACCS, several new types of equipment have been integrated into the data communications system: tactical network servers, packet radio switches, and tactical communication distribution nodes. Few Marines have the required knowledge to work with this new equipment.

Initial terminal configuration can be accomplished by trained data systems personnel. However, systems will fail and terminal configuration will have to be re-established. Unless the operator is trained, unacceptable down time could

be experienced while waiting for a data systems expert to remedy the problem. A similar situation will exist with LAN server configurations and the data communications system. While LAN administrators can be expected to configure servers within the system, trouble shooting will initially be the responsibility of the unit ISC due to the limited number of data systems personnel in the Marine Corps.

Program managers and systems-integration personnel have developed a comprehensive command and control family of systems. The fielding of these systems will significantly enhance the commander's ability to process information and make sound, timely decisions. The rapid rate in which the Marine Corps is introducing available information system technology is impressive. A high priority must be placed on training personnel to operate these new systems. Personnel must be trained, and in place, prior to system fielding. Identification of required skills is critical to this process. Successful fielding of MTACCS components and other data communication systems is dependent upon how successfully the Marine Corps educates the future information systems personnel who will fill the billets as unit ISCs.

PROPOSED SOLUTION

Forced reductions and budget cutbacks are facing all services; the Marine Corps is no exception. As the Marine

Corps cannot afford to train communications officers and data systems officers separately, efficiency dictates that they be combined into one Data Communications Officer MOS. Additionally, the recent implementation of Defense Management Review Decision (DMRD) 918 by the Defense Department has drastically changed the Marine Corps' data processing infrastructure.

Upon full implementation of DMRD 918, the Marine Corps will no longer require the 4002 MOS. All mainframe processing centers and design activities will be turned over to the Defense Information System Agency (DISA), which will be responsible for providing mainframe processing support to all the services. This process has already begun. Last year, the Marine Corps finance and records center at Kansas City was changed from a Marine Corps activity to a DISA activity. Other facilities such as the Central Design and Processing Activity (CDPA) at Quantico are scheduled for changeover to DISA in the near future. As this changes, the Marine Corps will effectively move out of mainframe processing, and the experience base required to manage these facilities will be drastically reduced. (4)

As the need for data processing officers is reduced, the need for officers skilled in tactical data communications will increase. The proposed MOS progression path begins with the lieutenant at the Basic Data

Communication Officer Course and lead to the captain at Command and Control Systems Course. Solving the problem of providing C2 system planners and creating a Data Communications Officer (DCO) can be accomplished in three phases.

PHASED APPROACH

The first phase will be an across the board redesignation of all 2502's and 4002's as Data Communication Officers, MOS 2502. This redesignation will occur from lieutenant to lieutenant colonel. Additionally, all table of organization (T/O) billets requiring either 2502 or 4002 will be changed to reflect the Data Communications Officer MOS 2502. Those billets that require specific mainframe computer skills after DMRD 918 implementation can be changed to either the Warrant Officer or Limited Duty Officer (LDO) 40XX MOS. In the words of Colonel D. P. Houston, "From this point on, Darwin's theory of evolution will occur. The officer who can [hack-it] will survive, while those who cannot will be [weeded-out]." (4) Officers within the Marine Corps have always taken pride in their ability to handle difficult and complex situations; successful completion of this billet assignment will be no different.

The second phase will combine the Basic Communication Officers Course (BCOC) with the Data Systems Officers Course (DSOC) within the Marine Corps University to create one

MOS-producing school for Data Communications Officers (DCO). Since DMRD 918 will eliminate the need to teach mainframe computing support skills to new officers, both Communication Officer School and Computer Science School must work together to create an officer capable of focusing on communications and tactical computer technology. The DCO will provide the Fleet Marine Force (FMF) and the supporting establishment an individual who is trained in communications and the tactical computer skills required to support MAGTF operations.

BCOC is now an eighteen week course, while DSOC is a fourteen week course. Both courses strive to instill in their students the basics of C2 systems; in many ways, their core curriculums complement each other. The object of combining the two schools is simple: to provide the Marine Corps with a single course of instruction which will prepare the DCO to survive the initial MOS assignment and successfully complete follow-on assignments.

The C2 systems information that they need will be the same regardless of assignment to the Fleet Marine Force or assigned to the supporting establishment. All required training must fit into a package of less than 20 weeks, thus reducing the Marines' time on temporary additional duty (TAD) and limiting the training, transient, patient, and prisoner (T2P2) cycle. (8) Appendix 1 represents a complete

illustration of the proposed 19 week/998 hour curriculum for the Basic Data Communications Officer Course (BDCOC). While this curriculum may require certain revisions, the major subcourses and hours are listed below:

SUBCOURSE	HOURS
- ADMINISTRATION	37.50
- COMMUNICATIONS SECURITY	16.50
- COMMAND POST OPERATIONS/DOCTRINE	39.50
- DATA	167.00
- EVALUATIONS	33.50
- EXPEDITIONARY OPERATIONS	31.50
- FIELD OPERATIONS	373.50
- LEADERSHIP	31.00
- MAINTENANCE	37.50
- SWITCHED BACKBONE SYSTEMS	108.50
- SINGLE CHANNEL RADIO	72.50
- THEORY	49.50
TOTAL HOURS	998.00

This proposal builds upon the basic curriculum used by BCOC and provides the DCO with essential information systems and data skills. Utilizing Individual Training Standards (ITS), the intent of this curriculum is to teach the DCO the skills necessary for effective job performance.

The third phase will require that the Marine Corps train the current company grade 4002 population to transition from a computer-only focus to a broader information systems focus. This could be accomplished by providing the FMF and supporting establishment additional quotas for 4002 officers to attend either Basic Data Communications Officer Course or Command and Control Systems Course at Communication Officers School. Upon completion, 4002 officers would be reassigned the primary MOS of 2502

and placed in Data Communication Officer billets.

Upon graduation, the DCOs will report for their first MOS assignment. Since all 2502 and 4002 MOS T/O line numbers are now MOS 2502, the amount of C2 systems information required for each assignment will vary. Whatever the assignment, the DCO will be expected to remain current with changing technology through on-the-job training, professional military education, and professional publications and seminars. In this way, the officer serving with the FMF and dealing with SINCGAR radios and communication operating instructions on a daily basis should be as knowledgeable about evolving computer hardware and software as his counterpart serving the supporting establishment at Headquarters Marine Corps.

ADVANTAGES & DISADVANTAGES

This integration proposal offers several advantages and disadvantages. Advantages begin with the money saved by the combination of facilities and consolidation of instruction into one MOS-producing school within the Marine Corps University. Additionally, production of a DCO reduces the need for specific follow-on communications and data systems training as the two technologies continue to expand. The Data Systems School will not, however, disappear. This school is required for entry level data systems instruction of enlisted personnel. It provides BANYAN VINES training

and certification within the Marine Corps; if required, it can provide unique data systems instruction to BDCOC graduates and other officers. The DCO additionally provides the commander with an individual who is the single point of contact concerning all C2 issues and can quickly provide the necessary C2 systems planning and engineering.

Critics of this proposal cite the disadvantage to this merger is the inability of the individual to retain C2 systems knowledge necessary for initial and subsequent duty assignments. (8) Current Marine Corps manpower policies regarding progression paths within communications and data systems MOSs also hinder, rather than help, the effort to provide officers capable of performing C2 systems planning. Officers in these progression paths are routinely interchanged between MOS-related assignments, both within the FMF and the supporting establishment and outside a specific MOS, such as recruiting or drill field duty. (8) The goal of this policy, to produce a balanced, well-rounded officer, may be achieved. However, this policy produces a rapid decline in technical MOS skills for significant periods of time. Given the rapid pace of technology development today, this policy is neither cost nor time effective.

Teamwork and cooperation is essential if the Marine Corps plans to provide effective C2 system planning.

Adjustments must include provisions which allow designated DCOs and C2 officers to remain in assignments or billets that positively affect increased MAGTF C2 systems planning and operations. This approach will serve to stabilize the C2 systems operation within the Marine Corps, prevent declining technical skills, and allow Marine Corps C2 systems planners and DCOs to keep pace with current state-of-the-art technology.

C4I SYSTEMS PLANNER ADDITIONAL MOS

As the DCOs progress through their careers, they will be forced to contend with rapidly expanding technology and the introduction of newly-fielded C2 systems. The DCOs receive their first real introduction into joint and combined C2 systems planning at the Command and Control Systems Course (CCSC) at Communications Officer School. Certain T/O billets within the communications and data systems fields require C2 specialists to conduct C2 systems planning. Until recently, neither these billets nor the officers possessing C2 systems planning experience were flagged in any manner by the Marine Corps manpower system. Therefore, no mechanism existed to ensure that officers capable of performing C2 systems planning were properly placed by the manpower system in billets requiring such skill.

Headquarters Marine Corps (HQMC), in its recent publication ALMAR 050/93, acknowledged the importance of maintaining a cadre of qualified C2 systems planners and the necessity of matching certain abilities to specific billets. This ALMAR outlines Marine Corps plans for the establishment of a C4I planner additional MOS. Whether the additional MOS is C4I planner or C2 systems planner, the intent of identifying specific officers for specific billets remains the same. The ALMAR which establishes this concept for the additional MOS is outlined as follows:

> The intent is to identify officers who have special education in C4I systems architecture... This additional MOS will be given to all Marine Corps officers, Captain to Lieutenant Colonel, who have graduated from CCSC since academic year 1992...Billets located within operating forces and supporting established units are being staffed for T/O modification and billet designator flagging...C4I planners will provide the unit commander with a knowledgeable staff planner in all areas of C4I systems...this assignment will additionally enhance speed and accuracy of C4I planning and improve unit capability to operate in the joint and combined environment. (1)

Success in future operations greatly depends upon how the Marine Corps manages the future of command and control. The focus of C2 can no longer be on any single piece of equipment. The DCO must focus on the entire C2 system and consider how this system interfaces with various joint and combined service agencies. The integration of C2 personnel, MOSs 2502 and 4002, coupled with the valid requirement of

providing specific C4I planners, works well to fully implement the C4I concept outlined by General Gray in 1991.

CONCLUSION

The C2 systems personnel required to meet the rapidly expanding technology of future operations can be achieved by integrating MOSs 2502 and 4002 at the officer level into one Data Communications Officer MOS. Additionally, designating graduates of the Command and Control Systems Course as C4I systems planners provides the Marine Corps with a nucleus of specifically trained command and control professionals. Through improved education, cooperation, integration of personnel, relaxation of certain MOS progression impediments, and logical billet utilization, the Marine Corps could greatly improve C2 systems planning and effectiveness. The Marine Corps can thus be assured that the C2 needs of commanders in future operations will be successfully met by a highly trained and skilled cadre of C2 systems planning professionals.

BASIC DATA COMMUNICATIONS OFFICER COURSE

SUBCOURSE - ADMINISTRATION

DESCRIPTION	HOURS
DCO SECURITY BRIEF	0.50
ADMIN/MEDICAL CHECK-IN	1.50
PUBS ISSUE	1.00
CLASS PHOTO	1.00
READING TEST	2.00
INVENTORY PFT	2.00
782 GEAR ISSUE	1.50
VEHICLE SAFETY BRIEF	0.50
782/PUBS TURN-IN	2.00
FINAL PFT	2.00
ADMIN PROCESSING	3.50
INITIAL COUNSELING	4.00
MIDTERM COUNSELING	4.00
FINAL COUNSELING	4.00
SECURITY DEBRIEF	0.50
GRADUATION REHEARSAL	1.00
GRADUATION PREP TIME	0.50
GRADUATION	1.00
GRADUATION RECEPTION	1.50
FINAL ADMIN CHECK-OUT	3.50
	37.50

SUBCOURSE - COMMUNICATIONS SECURITY

DESCRIPTION	HOURS
INTRO TO CMS SYSTEM	1.50
INTRO TO COMSEC EQUIPMENT	2.00
INTRO TO COMSEC	4.00
INTRO TO C2W	1.00
INTRO TO EW	1.00
USMC C2W	1.00
ECCM	1.00
INTRO TO USMC CMS	0.50
CMS MATERIAL ID	0.50
CMS ACCOUNTABILITY	1.00
PHYSICAL SECURITY	0.50
INSPECTION & AUDITS	1.00
EMERGENCY ACTION PLANS	0.50
CMS OVERVIEW	1.00
	16.50

SUBCOURSE - COMMAND POST OPERATIONS/DOCTRINE

DESCRIPTION	HOURS
COMM IN INF BN	1.50
RADIO CTR/COC	1.00
SYSTEM TROUBLESHOOTIUNG	1.00
CP SYSTEMS DEMO	2.50
EQUIPMENT PROTECTION	1.50
CP REQUIREMENTS/DISPLACEMENT	2.00
CP RECON/SELECTION	1.00
VISUAL & SOUND COMM	0.50
GCE LAYDOWN	1.50
COMM PLANS & ORDERS	1.50
COMM-ELEC ESTIMATE	1.00
COMM PLANNING	1.50
COMM FOR BN FSCC	1.50
COMM IN ARTY BN	2.00
INTRO TO MARINE AIR	1.00
INTRO TO DASC	1.00
INTRO TO TACC	1.00
INTRO TO MWCS	1.00
COMM IN MOUNT ENVIRONMENT	1.50
MSG FORMATS TRAFFIC	1.00
STATION COMM CRT OPS	2.00
CAST ENGINEERING	3.00
CAST TRAINER	8.00
	39.50

SUBCOURSE - DATA

DESCRIPTION	HOURS
INTRO TO DIGITAL COMMUNICATIONS	3.00
TERMINAL DEVICES	4.00
TERMINAL DEVICES PA	2.00
INTRO TO SPEED	1.00
SPEED PA #1	2.00
SPEED PA #2	2.00
DATA FOR ANNEX K	2.00
INTRO TO MICROCOMPUTERS	8.00
INTRO TO MICRO O/S	12.00
INTRO TO DOS	2.00
MICROCOMPUTER SECURITY	2.00
ENABLE OA	8.00
HARVARD GRAPHICS	4.00
CD ROM	2.00
MICROCOMPUTER TROUBLESHOOTING	12.00
MICROCOMPUTER TROUBLESHOOTING PA	4.00
INTRO TO LAN	2.00
LAN MANAGEMENT	3.00
LAN OPERATIONS	12.00

LAN PA	4.00
INTRO TO WAN	2.00
WAN OPERATIONS	12.00
WAN PA	4.00
MODEMS	2.00
LANEX	16.00
INTRO TO UNIX	1.00
UNIX	4.00
INTRO TO MAINFRAMES	2.00
INTRO TO PERIPHERALS	1.00
CAPACITY PLANNING	1.00
INFORMATION MANAGEMENT	1.00
MAINFRAME PA	3.00
NETWORKS AND MCDN	2.00
TERMINAL EQUIPMENT	2.00
HARDWARE LAB	4.00
INTRO TO ADA	1.00
ADA PRINCIPALS	8.00
PROJECT MANAGEMENT	4.00
ADVANCED DATA APPLICATIONS	4.00
FMF DATA APPLICATIONS	2.00
	167.00

SUBCOURSE - EVALUATIONS

DESCRIPTION	HOURS
ELEC/RADIO QUIZ	1.00
ELEC/RADIO QUIZ REVIEW	1.00
DATA COMM QUIZ	1.00
EXAM #1	1.50
EXAM #1 CRITIQUE	0.50
EXAM #2	1.50
EXAM #2 CRITIQUE	0.50
MIMMS QUIZ	1.50
MIMMS (MCI) EXAM	2.00
EXAM #3	1.50
EXAM #3 CRITIQUE	0.50
EXAM #4	1.50
EXAM #4 CRITIQUE	0.50
ISSUE ANNEX K (HW)	0.50
ANNEX K (HW)	10.00
C7 DIAGRAM	1.00
DATA EXAM #1	2.00
DATA EXAM #1 CRITIQUE	0.50
DATA EXAM #2	2.00
DATA EXAM #2 CRITIQUE	0.50
EXAM #5	2.00
EXAM #5 CRITIQUE	0.50
	33.50

SUBCOURSE - EXPEDITIONARY OPERATIONS

DESCRIPTION	HOURS
COMM GUARD SHIFT	1.00
COMM GUARD PA	1.00
DCS COMMON USER SYSTEM	2.00
INTRO TO EXPEDITIONARY OPS	2.00
USN COMMUNICATIONS	1.50
AMPHIB CONTROL AGENCIES	2.00
SATELLITE OPS	2.50
MEU (SOC)	1.50
AMPHIB COMM PLANNING	2.50
AMPHIB COMM PLANNING PA	1.00
INTRO TO SRIG	2.00
INTRO TO MPF OPS	2.00
SPACE SYSTEMS	1.00
MILITARY SATELLITE COMM	1.00
UHF TERMINAL EQUIPMENT	1.50
SATCOM PA	3.50
MAGTF COMM ARCHITECTURE	2.00
MAGTF COMM LAYDOWN	1.50
	31.50

SUBCOURSE - FIELD OPERATIONS

DESCRIPTION	HOURS
PHASE I: BILLETS	1.00
PHASE I: OP CHECK	2.00
PHASE I: PLANNING	2.00
PHASE I: BRIEFINGS	1.00
PHASE I: FIELD EXERCISE	45.00
PHASE I: EQUIPMENT PM	5.00
PHASE I: CRITIQUE	1.00
SINCGARS OP BRIEF	0.50
SINCGARS STUDENT PLANNING	1.50
SINCGARS OP, STAGE, BRIEF	1.50
SINCGARS FINAL EXERCISE	4.50
SINCGARS PM & DEBRIEF	1.00
INTRO TO PHASE 11	0.50
PHASE II: OPS BRIEF	2.00
PHASE II: BILLETS	0.50
PHASE II: PLANNING	8.00
PHASE II: OP CHECKS	4.50
PHASE II: REHEARSAL	5.00
PHASE II: MASS BRIEF	1.00
PHASE II: FIELD EXERCISE	68.00
PHASE II: CRITIQUE	1.50
PHASE II: EQUIPMENT PM	7.00
INTRO TO PHASE III	0.50
PHASE III: PLANNING	8.50

PHASE III: OPS BRIEF	2.00
PHASE III: BILLETS	1.00
PHASE III: OP CHECK & LOAD	3.50
PHASE III: REHEARSAL	3.50
PHASE III: MASS BRIEF	1.00
PHASE III: FIELD EXERCISE	68.00
PHASE III: CRITIQUE	1.00
PHASE III: EQUIPMENT PM	5.50
INTRO TO 8400	0.50
8400 STUDENT PLANNING	12.00
8400 BILLETS	0.50
8400 REHEARSAL	4.50
8400 MASS BRIEF	1.50
BLT CPX/8400	56.50
8400 CRITIQUE	2.00
8400 EQUIPMENT PM	5.00
DIVISION ORGANIZATION	5.00
FSSG ORGANIZATION	2.00
PLRS & GPS TRAINER	4.00
MEPG DISPLAY OF EQUIPMENT	4.00
MWCS ORGANIZATION	3.50
TOUR NAB/AMPHIB	4.00
	373.50

SUBCOURSE - LEADERSHIP

DESCRIPTION	HOURS
DIRECTORS REMARKS	0.50
INTRODUCTIONS	0.50
DCO BRIEF	0.50
VIEW OF INF BN CMDR	1.50
COMM IN EXTREME ENVIRONMENTS	1.50
COMMAND IN WAR	2.00
LEADERSHIP I: BATTLE STUDY	1.50
CHANCELLORSVILLE BATTLE STUDY	4.00
MILITARY BRIEFINGS	1.50
LEADERSHIP SYMPOSIUM	2.00
LEADERSHIP RECEPTION	1.50
LEADERSHIP DISCUSSION PANEL	2.00
LEADERSHIP II: SENIOR/SUBORDINATE	1.00
PROMOTIONS BOARDS	1.50
TRAINING THE DATA COMM PLATOON	2.00
TQL	1.50
FACAD TIME	5.00
DIRECTOR'S CLOSING REMARKS	1.00
	31.00

APPENDIX 1

SUBCOURSE - MAINTENANCE

DESCRIPTION	HOURS
MIMMS (MCI)	20.00
MIMMS PART I	1.00
MAINTENANCE MANAGEMENT FOR CMDRS	15.00
MIMMS FOR DATA COMM PLATOON	1.50
	37.50

SUBCOURSE - SWITCHED BACKBONE SYSTEMS

DESCRIPTION	HOURS
ANALOG TELEPHONES	1.00
FIELD WIRE INSTALLATION	2.50
SB-22 SWITCHBOARD	2.50
SB-3614 SWITCHBOARD	3.00
MDF EQUIPMENT	1.00
MDF INSTALLATION & OPERATION	3.00
NETWORK PLANNING & DOCUMENTATION I	1.00
SWITCHBOARD PA	3.50
RADIO-WIRE INTERFACE	1.50
ULCS	40.00
SBB SYSTEMS	0.50
JOINT TAC COMMUNICATION SYSTEM	0.50
DIGITAL TELEPHONES	2.00
SECURE NET RADIO INT	2.00
SB-3865 ULCS	3.00
SBB/TERM DEVICE PA #1	3.50
TRUNK ENCY DEV/KG-94A	1.00
NETWORK ENCRYPTION	1.50
NETWORK PLANNING & DOCUMENTATION II	3.00
MULTIPLEX CONCEPTS	1.50
RMC, TD-1324	2.00
SBB/RMC PA #2	3.00
LOS TX, MRC-135B	1.50
LOS TX, MRC-142	2.00
NETWORK TIMING	1.00
SBB/MRC-142 PA #3	4.00
NETWORK PLANNING III	3.50
SBB/SYSTEMS PA #4	6.00
SBB/SYSTEMS PA #5	8.00
	108.50

SUBCOURSE - SINGLE CHANNEL RADIO

DESCRIPTION	HOURS
LOS PROPAGATION PLAN	1.50
INTRO TO SCR	0.50
PORTABLE VHF SCR	1.00

APPENDIX 1

RTO PROCEDURES	1.50
FIELD MESSAGE DRAFTING	0.50
Q AND Z SIGNALS	1.00
SCR ANTENNAS	1.00
BATTERY MANAGEMENT & PLANNING	2.00
RADIO REMOTES	1.50
PORTABLE VHF PA	2.50
VEHICLE VHF RADIOS	1.50
VHF RETRANSMISSION	1.50
SCR/RTX PA	3.00
HF SCR	2.00
ANTENNA DESIGN I	1.50
ANTENNA PA #1	2.00
HF PREDICTION SYSTEM	0.50
HF PREDICTION SYSTEM PA	1.00
ACEOI/RADIO GUARD CHART	3.50
ACEOI/GUARD CHART PA	1.00
INTRO TO ECAC	1.50
TACTICAL FREQUENCY MANAGEMENT	1.00
HF NET ENGINEERING	1.00
HF NET ENGINEERING PA	1.00
OTAR/SARK OPS	2.00
OTAR/SARK PA	0.50
ANTENNA DESIGN II	4.00
INTRO TO SINCGARS	0.50
INTRO TO SINCGARS ICOM	2.00
SINCGARS THEORY	0.50
SC SINCGARS COVERED	1.00
FH DATA/CYZ-10 LOAD	2.50
NON-FH/COMSEC PA	2.00
SINCGARS FH OPENING	2.00
MAINTAINING FH NETS	2.00
SINCGARS FH PA	3.00
SINCGARS RETRANSMISSION	1.00
SINCGARS ANCILLARY/REMOTE	1.00
SINCGARS NECOS OPS	4.00
SINCGARS NECOS PA	2.50
UHF SCR PORTABLE & VEHICLE	2.00
MECHANIZED VEHICLE RADIOS	1.50
LAV-C2, BV, C7 DEMO	3.50
	72.50

SUBCOURSE - THEORY

DESCRIPTION	HOURS
INTRO TO ELECTRICITY	2.00
INTRO TO COMMUNICATIONS	1.00
BASIC ELECTRICITY I	2.00
BASIC ELECTRICITY II	2.00
ELECTROMAGNETIC SPECTRUM	1.00
BASIC ELECTRICITY III	2.00

ANALOG TELEPHONE	1.00
SWITCHING CONCEPTS	2.00
BASIC ELECTRICITY IV	2.00
INTRO TO ANTENNA THEORY	1.00
TX LINE THEORY	1.50
GROUNDING THEORY	1.00
AM/FM RADIO THEORY	3.00
GROUND INSTALLATION PROCEDURES	1.00
TYPES OF GROUNDS	1.00
HAZARD MATERIAL/HAZARD WASTE	1.50
MEPG POWER EQUIPMENT	1.00
MEPG THEORY	0.50
ANTENNA FUNDAMENTALS	4.00
MEPG LOAD PLANNING	2.00
HF COMM PRINCIPLES	3.00
GROUNDING PA	1.00
MEPG SELF PACED TEXT	6.00
MEPG PLANNING CONSIDERATIONS	1.00
MEPG SYSTEM DESIGN	2.00
MEPG SAFETY & MAINTENANCE	0.50
DIGITAL TELEPHONE	1.50
DIGITAL SWITCHING CONCEPTS	2.00
	49.50
TOTAL HOURS	998.00

BIBLIOGRAPHY

1. Commandant of the Marine Corps ALMAR 050/93. "Establishment of C4I Planner Additional MOS (AMOS)." HQMC: Washington, DC., 28 Jan 1993.

2. Commandant of the Marine Corps White Letter 01-91. "C4I2 Concept." HQMC: Washington, DC., 26 Jun 1991.

3. Espinoza, A. J. Major, USMC. C2 Acquisitions, Marine Corps Systems Command. Personal Interview, MCCDC. Dec 1992.

4. Houston, D. P. Colonel, USMC. Director, MCDPA. Personal Interview, MCCDC. Dec 1992.

5. Macedonia, M. R. Major, USA. "Information Technology in Desert Storm." Military Review, Oct, 1992:36.

6. Noel, M. D. Captain, USMC. C2 Acquisitions, Marine Corps Systems Command. Personal Interview, MCCDC. Feb 1993.

7. Simpson, R. D. Major, USMC. "Communication and Computer Systems; A Natural Connection." Unpublished Student Paper, Marine Corps Command and Staff College, Quantico, VA., 1992.

8. Shea, R. M. Colonel, USMC. Director, Communication Officers School. Personal Interview, MCCDC. Dec 1992.

9. Smith, R. N. Colonel, USMC. Branch Head CCT, HQMC. Personal Interview, MCCDC. Dec 1992.

10. United States Marine Corps. Marine Corps Lesson Learned System, Number 42320-31260. "Local and Wide Area Networks." After action item, submitted by Captain Learn, I MEF, Operation Desert Storm.

11. United States Marine Corps. Marine Tactical Command and Control System (MTACCS) Operational Concept, 26 Dec 1990.

12. Van Crevald, Martin L. Command In War. Cambridge, Massachusetts: Harvard University Press, 1985.